Title and acronym of the thesis:

Domoïc acid contamination and decontamination in PEctinids during *Pseudonitzschia* toxic blooms. (Acronym: PEP)

Research unit and host team:

LEMAR UMR6539 CNRS/UBO/IRD/IFREMER Laboratory of Marine Environmental Sciences, PANORAMA Team: Integrative physiology and adaptation of marine organisms: from gene to population

Laboratory website: https://www-iuem.univ-brest.fr/lemar/

Supervisors:

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Project Summary:

Since the 2000s, several aquaculture sites on the Channel-Atlantic coast have been facing recurrent blooms of the toxic microalgae *Pseudonitzschia* (PSN), which produces domoic acid (AD), an amnesic neurotoxin (Amnesic Shellfish Poisoning). DA can bioaccumulate in high doses in filter-feeding shellfish, thus rendering their consumption dangerous, with severe consequences on human health. This is the case of the scallop *Pecten maximus*, the third species sold under French auctions for a total of 75 million euros in 2016. The scallop fishery is operated by a large fleet fishing all the way from northern France to the Pertuis Charentais. Unlike other bivalves, P. maximus decontaminates DA very slowly (Blanco et al 2002; Amzil et al 2006), forcing partial or total closure of the scallop fishery over very long periods of time (several months to years) with major economic consequences in areas where pectinids are exploited. Thus, the fisheries in the Bay of the Seine, Morbihan, Glénan, Brest harbour and Pertuis Charentais have been regularly closed, sometimes for several years, with some fishing being re-directed on black scallops *Chlamys varia*. In this context of increasing harmful algal blooms and its consequences on the scalloping *P. maximus* economic activity, it is urgent to understand the reasons for the slower decontamination of *P. maximus* in DA compared to other pectinids, such as the black scallop *Chlamys varia*.

This thesis project aims to carry out a comparative study of the mechanisms of contamination and decontamination of DA by scallops of both species *P. maximus* and *C. varia,* to improve the management of the scallop fisheries, often subjected to toxic episodes.

Different tissus and organs of both bivalve species will be sampled to 1) quantify the DA by tissue, 2) locate DA at the cellular and subcellular level by immunohistochemistry and

fractionation, and 3) perform targeted molecular analysis of membrane transporters, which potential absence in *P. maximus* could explain their slow decontamination (Mauriz and Blanco 2010, Pazos et al 2017).

This project should provide a follow-up of the contamination/decontamination kinetics and localization of DA in tissues by different techniques, for a better understanding of the differences between *P. maximus* and *C. varia* and the physiological mechanisms associated with DA retention by *P. maximus*. This knowledge is necessary to identify solutions to reduce contamination or accelerate decontamination and thus potentially propose scenarios for accelerating the decontamination of DA in *P. maximus*.

This thesis project is based on a "France Filière Pêche" MASCOET project currently under evaluation, which will finance 50% of the scholarship and all operating costs for the thesis.

Profile of the candidate (scientific and technical skills required):

Candidate with skills in marine invertebrate physiology and ecology (cellular, biochemical and molecular approaches) and ecophysiology. Experimental design skills and statistical analysis of experimental data. Experience working in multidisciplinary teams and the ability to communicate in English are highly desirable.